

## MMS ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

**Region:** Alaska

**Planning Areas:** Cook Inlet

**Title:** Seasonality of Biophysical Boundary Conditions for Cook Inlet, Alaska (93-48-59)

**MMS Information Needs to be Addressed:** Information will be used for NEPA analyses and documentation for Cook Inlet Lease Sales and to enhance further circulation and trajectory models.

**Total Cost:** \$264,000

**Period of Performance:** FY 2003-2008

**Conducting Organization:** CMI, UAF

**MMS Contact:** [Chief, Alaska Environmental Studies Section](#)

### **Description:**

#### Background

Improved understanding of density-driven and other circulation in Cook Inlet is needed for development of more sophisticated oil spill models. Present oil spill models for Cook Inlet are two dimensional and lack sufficient data in Cook Inlet to develop more useful three dimensional models. That is, they model only surface distribution of an oil spill. Developers of local numerical circulation/spill trajectory models and planners of Geographical Response Strategies need physical measurements by which their respective models and operational plans can be validated and improved.

#### Objectives

1. Measure Cook Inlet temperature, salinity, and hydrography from which the density-driven, geostrophic and other circulation within the inlet can be derived.
2. Deploy drift cards whose deployment locations will be used as input to the CIRCAC numerical spill trajectory model for simulations of point source spills and whose recovery locations will then be compared to the grounding locations of the simulated spills.
3. Involve local high school science classes in the reparation, field work/data acquisition and data analyses for temperature and salinity measurements.
4. Measure seasonal changes in volume and property fluxes at the inflow and outflow boundaries in Cook Inlet.
5. Continuously monitor freshwater signals in central and lower Cook Inlet by deploying moored conductivity-temperature-depth (CTD) sensors near the Forelands (in central Cook Inlet) and near Nanwalek in lower Cook Inlet.

### Methods

1. Schedule spring and late summer sampling periods to correspond to period of increasing and diminishing fresh water runoff into Cook Inlet.
2. CTD casts at 1-2 nautical mile spacing along ~20-40 km offshore transects near participating high schools.
3. Take additional CTD cast along the transect on each side of visible fronts.
4. Plot cross sections and surface maps of the temperature, salinity, density, and geostrophic velocity (dynamic topography) fields after the spring, summer and fall hydrographic surveys.
5. Acquire seasonal hydrographic and velocity measurements along transect lines crossing Kennedy Entrance, Stevenson Entrance, Shelikof Strait, Cook Inlet (Red River to Anchor Point), Kachemak Bay (Barbara Point to Bluff Point) and at the Forelands.
6. Analyze data and report properties.

**Current Status:** The P.I. is addressing comments on draft final report.

**Final Report Due:** March 30, 2008

**Publications Completed:** None

**Affiliated WWW Sites:** <http://www.mms.gov/alaska/>  
<http://www.sfos.uaf.edu/cmi/>

**Revised Date:** March 2008